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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,859	03/24/2004	Hiroshi Kurachi	789_129	5516

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EXAMINER	
MERKLING, MATTHEW J	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
04/28/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/807,859	KURACHI ET AL.	
	Examiner	Art Unit	
	MATTHEW J. MERKLING	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 6-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 6-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3 and 6-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (US 6,770,181 hereinafter Kato) in view of Yamada et al. (US 5,288,389), Sugiyama et al. (US 6,660,142) and evidenced by Kato et al. (US 5,976,335 hereinafter Kato '335).

Regarding claim 1, Kato discloses a gas sensor comprising a sensor element (Fig. 20) having a gas-introducing hole (gas-introducing port, 22) close to an end of said sensor element (col. 8 lines 33-34), a clogging preventative space (122, col. 19 lines 46-51) and a buffering space (124). Kato discloses said sensor element including a first space (first chamber, 18) for introducing a measurement gas thereinto from said gas introducing hole via the clogging preventative space (124), the buffering space (124) and a first diffusion rate-determining section (26), a main pumping means (cell, 44) for controlling a partial pressure of oxygen contained in said measurement gas introduced into said first space (col. 10 lines 3-9). Kato discloses a second space (chamber, 20) for introducing said measurement gas thereinto from said first space via a second diffusion rate-determining section (28) (col. 8 lines 36-42). Kato also discloses an 'electric signal-generating converting means' for reducing (i.e. converting) a NOx component contained

in said measurement gas (col. 10 lines 46-48) introduced from said second space (20) via a third diffusion rate-determining section (62) and generating an electric signal (Ip2) by measuring a pumping current produced by operation of the measuring pumping cell (col. 10 lines 42-45). Said electric signal (Ip2) is measured by an ammeter (68)(col. 10 lines 56-58), which corresponds to a NOx concentration in said measurement gas (col. 13 lines 53-55).

Furthermore, Kato discloses a first detecting means including an inner electrode in said first space (40) and a reference electrode (48) in said reference gas-introducing space, and further discloses utilizing said inner electrode for determining the air-fuel ratio (col. 3 lines 51-58). Kato also discloses said first detecting means determines the air-fuel ratio from a voltage (V1) between said inner electrode and said reference electrode (col. 9 lines 44-52) and a pumping current (Ip1) of said main pumping means (col. 10 lines 6-15).

Kato discloses all of the claim's limitations as set forth, but Kato does not explicitly disclose the limits of the ratio *Wc/We* wherein *We* represents a lateral width of the sensor element end and *Wc* represents a lateral width of a gas-introducing hole.

Yamada also discloses a gas sensor (see abstract).

Yamada et al. teaches a sensor element with a width (fig. 1) of the adhered margins of the sensor element, which is a space between an edge of the sensor element and an electrode (14), to be '*a*'. Yamada et al. also teaches (figs. 2 & 3) that the width of the electrode (14) is coincident with the width of a measuring gas space (18). Yamada et al. teaches said '*a*' (fig. 16) to have a value > 0.7mm (col. 9 lines 28-37) with a width of the

sensor element, w (*We* of above), to be 4.0mm. This will give a measuring gas space width (*w–2*a*) to sensor element width (*w*) ratio ((*w-2*a*)/*w*) of < 2.6mm/4mm or less than 0.65 (65%), which also corresponds to an adhering margins width (2*a*) to sensor element width (*w*) of >0.35 (35%). Yamada et al. uses this ratio to improve resistance to thermal shock (col. 9 lines 34-37). Combining with Kato (fig. 19B), where the measuring gas space (18) is the same lateral width as the gas-introducing width (*Wc* = (*w-2*a*)), this will give a *Wc/We* ratio of < 2.6mm/4mm or less than 0.65 (65%). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize adhering margins (2*a*) greater than 35% of the total width (*w*) of the sensor element as taught by Yamada (col. 9 lines 34-37) for the gas sensor of Kato in order to make the sensor more resistant to thermal shock. The use of >35% adhering margins would result in a gas sensor for Kato having a *Wc/We* of less than 65%, which would read on the claimed *Wc/We* condition.

Furthermore, the modified Kato discloses all of the claim limitations of the gas sensor, but the reference does not explicitly disclose the placement of the heater (fig. 2 (80)) within the sensor element or that the projected position of the end of said heater (fig. 2 (80)) is approximately coincident with a projected position of a starting end of said first space.

Sugiyama also discloses a gas sensor (see abstract).

Sugiyama teaches a sensor element where the distance between the end of the sensor element and the beginning of a heater, *Y* (*La*), is a variable that affects the thermal stability of the sensor element as well as the performance of the gas sensor with respect

to temperature control of the sensor element (col. 2 lines 27-38). The placement of the heater in the sensor element is not considered to confer patentability to the claims. Moreover, placing the beginning of the heater coincident with a starting end of a measuring space is not new in the art, as shown by Kato '335 in Fig. 1. As the placement of the heater in the sensor element is a variable that can be modified, as is taught by Sugiyama et al. (col.1 lines 44-54), to alter the thermal stability and performance of the sensor element, the placement would have been considered a result effective variable by one having ordinary skill in the art at the time the invention was made. As such, **without showing unexpected results**, the claimed placement of said heater cannot be considered critical. Accordingly, one of ordinary skill in the art at the time the invention was made would have optimized, by routine experimentation, the placement of the heater in the modified Kato to obtain the desired thermal stability and functionality of the sensor element (In re Boesch, 617 F. 2d. 272, 205 USPQ 215 (CCPA 1980)). Since it has been held that where general conditions of the claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 223).

Regarding claim 2, Kato further discloses a gas sensor wherein an electric signal-generating converting means is a measuring pumping means which reduces or decomposes the NO_x component in a measurement gas introduced from the second space (chamber, 20) by passing the third diffusion rate-determining section (62) which pumps oxygen produced from reduction/decomposition and detects a current (Ip2) generated by pumping oxygen out (col. 10 lines 46-59).

Regarding claim 3, Kato further discloses gas sensor (Fig. 31) with a signal generating converting means where NO_x is reduced/decomposed by a third rate determining section (62) and an electromotive force (V2) corresponding to the difference in oxygen concentration between the amount of oxygen around the detecting electrode (162) and the oxygen concentration of the atmosphere around the reference electrode (48) (col. 20 lines 31-38).

Regarding claim 6, Kato further illustrates that each of the first diffusion rate-determining section and the second diffusion rate-determining section (figs. 19A, 19B, 20) is defined by a slit provided in said sensor element (col 17 lines 1-5).

Regarding claim 7, Kato further discloses a gas sensor (fig. 20) including a fourth diffusion rate determining section (126) between gas introducing hole (port, 22) and the first diffusion rate-determining section (26). The space between the gas introducing hole (port, 22) and the diffusion rate-determining section is disclosed as a clogging preventative space (col 19. lines 45-50). Kato also discloses (col. 16 lines 58-67) another space between the fourth diffusion rate determining section (126) and first diffusion rate determining section (28) as a buffering space (22) to help dampen exhaust gas pulsation and limit its effect on the gas sensor.

Regarding claim 8, Kato further illustrates (figs. 19A, 19B, 20) the fourth diffusion rate determining section (126) as being defined by a slit in said sensor element (col. 19 lines 6-7).

Regarding claims 9 and 10, Kato further illustrates (fig. 19B) the clogging preventative space (122), buffering space (124), slit of first diffusion rate-determining

section (30, 32), slit of fourth diffusion rate-determining section (128, 130) to be substantially identical with each other, and the lateral widths of gas introducing hole (22) and clogging preventative space to be substantially identical (122).

Regarding claim 11, Kato further discloses (col. 11 lines 9-23) an auxiliary pumping means (cell, fig. 31, (72)) for controlling a partial pressure of oxygen in the measurement gas introduced into sensor space.

Response to Arguments

3. Applicant's arguments filed 2/9/09 have been fully considered but they are not persuasive.

4. On page 2, Applicant argues that the examiner mischaracterizes Fig. 1 of Kato '335 by stating:

> *"The heater 94 in Fig. 1 of Kato '335 is actually positioned directly below and within the area of the inner pumping electrode 62, and, therefore, the heating element is actually positioned well within the first space, not coincident with the starting end of the first space as asserted by the PTO."*

It is noted however, that the claim does not state the "heating element" extends only to a starting end of said first space, but rather the "heater" extends only to a starting end of said first space. In Fig. 1 of Kato '335, the heater, in which the examiner includes the entire heating structure (including the ceramic portion), not only the heating element, the heater is clearly coincident with the starting end of the first space (58).

On page 2 and 3, Applicant goes on to argue that one of ordinary skill would not be motivated by the teachings of Sugiyama to move the heater of Kato '181 because the heater of

Kato '181 is already far enough away from the end of the sensor element to satisfy the requirements of Sugiyama.

It is noted however, that Kato '181 was not modified with the structure of Sugiyama. Sugiyama was mentioned merely to indicate that the location of the heater in the sensing element is varied with respect to the front face of the sensor in order to maximize the thermal stability of the sensor element. And therefore, moving the heater of Kato '181 to maximize the thermal stability would lead one of ordinary skill to find that a location that is coincident with the first space is preferable.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795